Notes

Atomic Energy Control Board | Commission de contrôle de l'énergie atomique

INFORMATION BULLETIN 85-2

June 24, 1985

REGULATORY RESEARCH PROGRAM FOR 1985/86

PROJECT DESCRIPTIONS

The Regulatory Research Program is intended to augment and extend the Atomic Energy Control Board's regulatory program beyond the capability of in-house resources. The overall objective of the research program is to produce pertinent and independent information that will assist the Board and its staff in making correct, timely and credible decisions on regulating nuclear energy.

The program is divided into ten main areas of research covering the safety of nuclear facilities, radioactive waste management, health physics, physical security and the development of regulatory processes. A total of 85 projects are planned for 1985/86, including a number which are ongoing from the previous fiscal year.

Most of the projects will be carried out under contracts issued through Supply and Services Canada.

This Information Bulletin contains a list of the projects with a brief description of each.

A separate document describing how the AECB Regulatory Research Program is administered may be obtained by contacting:

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REGULATORY RESEARCH PROGRAM FOR 1985/86

1. Nuclear Reactors

84. 1. 1 The Permeability of Containment Concrete for CANDU Reactors

It is proposed to continue the experimental program which was started in FY 83/84 to investigate factors affecting the permeability of concrete samples artificially aged through freeze-thaw cycles. An attempt will be made to correlate any changes in permeability with initial conditions of internal cracking.

Previous, specially-prepared, small-scale samples showed very low permeabilities close to those of hard, sound rocks. The present program is, therefore, performed to identify whether the high permeabilities observed in some field structures are due to inherent construction defects and/or the aging process of the concrete.

The results of the study would provide information on whether laboratory techniques can be used to simulate leakage as reported from actual containment structure leakage tests and on whether leakage can be expected to increase with aging.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$27K	$38K	$2K			$67K

S.A.: A. Omar
Category: 1

Source: SED
Contact: G.J.K. Asmis

84. 1. 3 Primary Pump Stresses under Off-Normal Hydraulic Loadings

It is proposed to conduct a study to identify and evaluate the level of stresses in the primary pump under off-normal hydraulic loadings. Particular attention would be focussed on pump internals; for example, bearings, seals, impeller and shaft.

The study would be done to confirm licensee claims that pumps will operate under all postulated accident conditions.

The results of the proposed project will be used in assessing licensee claims regarding the integrity of primary pump internals in scenarios involving off-normal hydraulic loadings.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
			$50K		$50K

S.A.: A. Omar
Category: 3

Source: CQAD
Contact: B. Jarman

84. 1. 4 The Degradation of Zirconium Alloys in Nuclear Reactors

It is proposed to continue the critical review which was started in FY 84/85 to identify the degradation mechanisms of zirconium alloys in CANDU reactor environments. The review includes information on the long-term effects of, at least, corrosion, irradiation, hydridization and creep. The study is being carried out on relevant literature from non-Canadian sources and will highlight practical, remedial or preventative actions.

This work was undertaken to obtain an independent, critical review of non-Canadian information on the behaviour of zirconium alloys in a nuclear reactor environment.

The findings of this review and the information collected on the inspection of CANDU Zr-Nb tubes will be used to determine the safe service life of pressure tubes in CANDUs.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$5K	$30K	$35K	$35K	$105K

S.A.: A. Omar
Category: 1

Source: RRB
Contact: W.A. Grant

84. 1. 5 Fibre Reinforced Plastics in Humid Vacuum Environments

It is proposed to conduct tests to investigate the deterioration rate of fibreglass under wet and vacuum conditions encountered in some CANDU applications. Samples of the materials and models of in-use dousing systems would be used in the tests.

The work would be performed to obtain an independent assessment of the degree to which fibreglass can withstand high humidity and vacuum environment. Any decision on whether to proceed would only be made after assessing studies being carried out by the utilities.

The results of the tests would be used in evaluating licensee assumptions in relation to determining the degradation rate of fibreglass used in CANDU applications.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
			$50K		$50K

S.A.: A. Omar
Category: 3

Source: CQAD
Contact: J.K. Pereira

84. 1. 6 Instrument Behaviour under Off-Normal Conditions

It is proposed to conduct a study on the behaviour under selected accident conditions of instruments used in CANDU reactors. Emphasis would be placed on level-indicating instrument readings in turbulent two-phase situations. The study would also address the accuracy of thermocouples, pressure transducers and flow meters when they operate at the extremes of their scales.

Information on instrument behaviour under accident conditions is scarce. This work, therefore, would generate new knowledge necessary to improve the understanding of instrument readings during off-normal events.

The results of this study would be used in assessing licensee assumptions regarding trip settings and accident scenarios.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$40K			$40K

S.A.: A. Omar
Category: 1

Source: RRB
Contact:

84. 1.11 Vibration Forcing Function on Primary Pumps

It is proposed to determine the pump head pulsation frequency, the acoustic modes of, and the forcing functions acting on the primary heat transport pump and piping system which would result from operating the primary pumps in two-phase flow conditions.

This work will produce information on the behaviour of primary pumps which does not exist in the open literature.

The results of the proposed project will be used in assessing the methods used by licensees in calculating fluid loadings on the primary heat transport piping system.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$25K	$10K		$35K

S.A.: A. Omar
Category: 1

Source: SED
Contact:

84. 1.12 Criteria for Identification and Evaluation of Fire Hazards

A contract is under way to develop a comprehensive methodology for assessing fire protection measures in CANDU nuclear power plants.

In the safety analyses of CANDU nuclear power plants it is a requirement that consideration be given to potential fire hazards. The information that would be produced by this contract is necessary to ensure that AECB staff remain in a position to assess authoritatively such hazards.

The results of the contract would be of use to AECB staff in the assessment of licence applications and in the formulation of guidelines appropriate to fire hazards in CANDU nuclear power plants.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$50K	$60K			$110K

S.A.: D.J. Martin
Category: 1

Source: SED
Contact: B. Finigan

84. 1.13 Hydrogen Absorption in Zircaloy at High Temperatures

It is proposed to perform experiments to determine whether hydrogen could be absorbed rapidly in Zircaloy at high temperature under hypothetical accident conditions in CANDU reactors. The tasks would include determining the migration rate of hydrogen to colder metal and the resulting degree of embrittlement. Phase I of the study addressed the rationale of the proposed program, and was completed in FY 84/85.

The program would provide an independent viewpoint on the severity and the size of the problem of hydrogen absorption in Zircaloy at high temperatures.

The outcome of this proposed experimental program would be used in evaluating the source term necessary to calculate the upper bound of fission product releases.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$18K	$75K	$50K		$143K

S.A.: A. Omar
Category: 2

Source: SED
Contact: V.Q. Tang

84. 1.17 Computer Software Quality Assurance

A project is under way which will survey the world literature on latest developments in computer software quality assurance (QA) programmes. The survey would identify what are considered to be the best applicable standards and techniques for QA programmes during the initial development of the software and then subsequently identify applicable standards and techniques for the maintenance and preservation of the software during operation.

The work is proposed because it is essential to have adequate QA procedures for computer software. The AECB therefore needs to be aware of methods for evaluating the adequacy of software QA programmes.

The results of the study will be used in the assessment of licensee software QA programmes and in formulating regulatory requirements for such programmes.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$10K			$20K

S.A.: D.J. Martin
Category: 1

Source: SED
Contact: D. Scrimger

84. 1.20 A Tool to Analyze Real-Time Programs

A project is proposed which would demonstrate to the AECB a new technique which represents computer programs in a graphical form.

Real-time process control programs are complex. Errors of programming or logic have implications for the safety of the controlled process. One aspect of evaluating such programs is whether or not they are readily testable. The AECB therefore requires a method or tool to analyze the testability of real-time programs.

The output of the project would be a computer-based tool which could analyze computer programs in such a way that their testability could be investigated.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$80K	$40K		$120K

S.A.: D.J. Martin
Category: 1

Source: SED
Contact: D. Connelly

84. 1.22 Role of Simulators in Operator Training and Certification

A project is proposed which would assess the role of part-scope and full-scope simulators in the training, certification, and skills and knowledge maintenance of the CANDU nuclear power plant control room operator. In addition, a review of existing simulators would be performed.

This project would be undertaken in order to increase AECB awareness and understanding of the use of simulators in nuclear power plant control room operator training and to support the activities of the AECB Operator Certification Group.

The results of this human factors project will be used by the AECB to establish a basis for deciding future regulatory requirements pertaining to the use of simulators in nuclear power plant control room operator training and certification.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$60K			$60K

S.A.: D.J. Martin
Category: 1

Source: SED
Contact: L. Gorrell

84. 1.23 Testing Diagnostic Skills in Certification Examination

A project is proposed which would review various methods by which the diagnostic skills of CANDU nuclear power plant control room operators could be tested for purposes of certification. This project would also develop an experimental method for comparatively evaluating different testing methods.

This project is required to support the activities of the AECB Operator Certification Group and to ensure that control room operators are adequately trained and effectively examined.

The results of this human factors project will be used by the AECB Operator Certification Group in the continuing development of control room operator certification examinations.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$50K			$50K

S.A.: D.J. Martin
Category: 1

Source: SED
Contact: L. Gorrell

84. 1.26 Review of Control Room Emergency Operating Procedures

It is proposed to continue a project which will review recent approaches to the development of nuclear plant control room emergency operating procedures and assess the need for improved emergency operating procedures in CANDU nuclear power plant control rooms. In addition, the project will develop a set of criteria for regulatory assessment of existing or proposed CANDU control room emergency operating procedures.

This project was prompted by published new approaches to the development of control room emergency operating procedures coupled with the need for the AECB to establish regulatory assessment criteria on the topic.

The results of this human factors project would be used by the AECB to identify potential inadequacies in existing nuclear power plant control room emergency operating procedures and to assess proposed changes to these procedures.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$40K	$60K			$100K

S.A.: D.J. Martin
Category: 1

Source: SED
Contact: L. Gorrell

84. 1.27 Practices for the Upkeep of Overpressure Protection Devices

The title of this project was changed to reflect the intent of broadening the scope to include all types of overpressure protection devices. It is proposed to continue with a critical survey to examine, summerize, comment, and make recommendations as necessary on field practices for maintenance, repair, testing and setting of overpressure protection devices in nuclear and other industrial installations.

The work was proposed to generate information necessary to assess licensee compliance with the appropriate codes and standards.

The findings of the survey will be used to assess compliance with the licensing conditions in this area of PRC regulation.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$25K			$25K

S.A.: A. Omar
Category: 1

Source: CQAD
Contact: R.F. Hawkins

84. 1.28 Flaw-Sizing Using Ultrasonic Techniques

It is proposed to continue a state-of-the-art review and perform tests to characterize, compare and highlight the variation in indications obtained by ultrasonic techniques when used for flaw sizing.

The data are needed to provide independent information on ultrasonic techniques and their limits of applicability.

The outcome of the review will be used to evaluate the adequacy of the techniques and equipment used by licensees in sizing defects and flaws.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$15K	$25K			$40K

S.A.: A. Omar
Category: 1

Source: CQAD
Contact: G. Yih

84. 1.29 Thermosyphoning Test Facility

It is proposed to design, construct and then use an integrated test facility with unique design features for the specific purpose of identifying phenomena pertinent to core cooling without forced circulation. The facility would also be used to produce benchmark problems against which licensee computer codes could be tested.

Under two-phase conditions, ultimate heat removal from the core by the steam generators in the absence of forced circulation may be lessened by separate effects such as flooding, reflux condensation, and channel-to-channel interaction. Existing analytical models addressing such effects are based on results obtained from multipurpose test facilities with limited capabilities. The proposed facility, which would be dedicated to thermosyphoning tests, would provide independent information with which to confirm the behaviour observed in recent thermosyphoning flow visualization experiments, and would address AECB staff concerns as to how the CANDU reactor would behave under postulated loss of forced circulation scenarios.

Data from this facility would provide qualitative insight into the thermosyphoning phenomena in CANDU reactors, assist in developing guidelines for plant operational procedures following loss of forced circulation, provide benchmark cases for testing the analytical codes used by licencees, and provide information necessary for evaluating licence submissions.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$190K	$300K	$500K	$800K	$1,790K

S.A.: A. Omar
Category: 2

Source: SED
Contact: A.M.M. Aly

84. 1.30 Fuel/Coolant Interaction after Pressure Tube Rupture

It is proposed to conduct a study to investigate the potential for steam explosion resulting from molten fuel/moderator interaction following a postulated fuel channel blockage accident. The investigation would involve a critical review of the available experimental and analytical information on the subject.

The study would provide AECB staff with independent information with which to assess whether a steam explosion could occur in, and whether existing models are adequate to describe, a fuel channel blockage event in a CANDU reactor.

The results of this study would be used by AECB staff in assessing licence submissions on fuel channel blockage accidents.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$40K			$40K

S.A.: A. Omar
Category: 1

Source: SED
Contact: V.Q. Tang

84. 1.31 Secondary Side Heat Sink Performance

A project is proposed which would provide a computer simulation of the performance of the secondary side heat sinks of a nuclear reactor.

Current safety analyses do not include all the factors which affect the secondary side response to plant transients - factors such as control algorithms, default values in software, component protection, etc. The proposed project would identify all such constraints and simulate their interaction with the physical performance of the secondary side to obtain a more realistic indication of the secondary site response.

The output of the project would be a computer simulator which would enable AECB staff to evaluate more fully the assumptions in existing safety analyses which address heat sink adequacy.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$50K			$50K

S.A.: D.J. Martin
Category: 2

Source: SED
Contact: C.T. Downie

84. 1.32 Vibration Probe Monitoring of Structure Deterioration

It is proposed to conduct a study on the possible use of vibration probes for monitoring the long-term deterioration of CANDU structures such as supports for vessels and piping.

Changes that occur with time in vibration frequency and mode shape may be precursors to structural deterioration. This work would develop a monitoring system and address the accuracy required to achieve estimates of the degree of deterioration. This work will not be proposed for commencement until the results of 84.1.39 have been assessed.

The results of the project would assist AECB staff in deciding whether vibration monitoring is a potentially valuable diagnostic tool that should be installed in nuclear plants.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
			$25K		$25K

S.A.: A. Omar
Category: 3

Source: SED
Contact: G.J.K. Asmis

84. 1.37 Pressure Tube Rupture in a Closed Tank

It is proposed to construct a test facility which could reproduce the effects of a pressure tube rupture on core internals. This would be achieved by preserving the thermohydraulic features of the transient involved and maintaining the relative geometric arrangement of in-core components (pressure tube/calandria tube arrays and shut-off-rod guide tubes in particular).

Consequences of a pressure tube/calandria tube rupture are normally examined using simplified mechanistic models which have been verified against experiments that do not entirely represent CANDU conditions. The proposed facility would provide experimental evidence relevant to several AECB staff concerns, and would provide new and independent information on break discharge characteristics and the short and long-term response of the calandria internals to a postulated pressure tube rupture.

The proposed facility would be designed to reflect the CANDU pressure tube/calandria tube assembly and the tests would be done under CANDU conditions. Therefore, the results would address remaining questions regarding the extent of damage of the shut-off-rod guide tubes and the propagation of failure to other pressure tube/calandria tube tubes. The facility may also produce benchmark cases against which current analytical codes could be tested. The information would ultimately be fed back to the assessment and evaluation of licence submissions.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$60K	$50K	$300K	$1,000K	$1,410K

S.A.: A. Omar
Category: 2

Source: SED
Contact: A.M.M. Aly

84. 1.38 Crack and Fracture Behaviour in Tough Ductile Materials

It is proposed to complete a critical review of the criteria which govern crack initiation and growth, and fracture instability in tough ductile materials.

The study will compile and critically review the state-of-the-art knowledge on elastic-plastic and fully plastic fracture for the purpose of enhancing the effectiveness of defect assessment and fracture appraisal.

Knowledge gained in this study would be used by the staff of the AECB, and other regulatory agencies, to review current defect appraisal procedures and techniques.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$15K			$25K

S.A.: A. Omar
Category: 1

Source: CQAD
Contact: K. Pereira

84. 1.39 Mode Shape and Frequency Identification for Seismic Analysis

It is proposed to continue with a study to explore the feasibility of using broad band background vibrations to determine mode shapes and frequencies of structures and components in a nuclear power plant.

The information is needed to help decide whether vibration probes can be used to verify analytically derived frequencies and mode shapes of key seismically qualified components.

The results of this contract would inform AECB staff of the type and location requirements of transducers, the type of equipment and the techniques required for data acquisition and reduction, the accuracy that can be achieved and the approximate cost of installing such a vibration identification system.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$5K	$20K			$25K

S.A.: A. Omar
Category: 1

Source: SED
Contact: G.J.K. Asmis

85. 1. 3 **Reliability of Microcircuits in Nuclear Power Plants**

It is proposed to conduct a study to collect and critically review available information on the limitations of microcircuits used in a nuclear environment.

Microcircuits are being used more extensively for control and monitoring functions in nuclear power plant designs. Since these circuits operate on very small currents, it is necessary to have state-of-the-art information on their susceptibility to transients and other external influences which may affect their operation.

The results of the proposed work would be used to evaluate the adequacy of present licensee design guidelines with regard to the use, qualification and separation of microcircuits in certain areas of nuclear power plants.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$25K			$25K

S.A.: A. Omar
Category: 1

Source: POPRD
Contact: P. Marchildon

85. 1. 4 Aerosols and Fission Product Transport

A contract is proposed to investigate the potential effects of aerosols on fission product transport within and without reactor containment, and to assess mathematical models and computer codes used to describe aerosol behaviour.

Recent advances in the modelling of fission product behaviour in containment are resulting in decreases in the predicted quantities of gas-phase radioisotopes available to contribute to public radiation doses after a postulated accident in a CANDU nuclear power plant. This implies that the relative importance of the airborne liquid-phase and solid-phase components has been increased. The intent of this contract would be to perform an initial evaluation of the extent of this potential contribution to doses, and to assess the suitability of available mathematical models for CANDU safety analyses.

The results of this contract would be of use to AECB staff both in the formulation of guidelines and requirements for safety analyses and in the assessment of future license applications for CANDU nuclear power plants in which aerosol modelling may be included.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$60K			$60K

S.A.: D.J. Martin
Category: 2

Source: SED
Contact: R.L. Ferch

2. Heavy Water Production Plants

84. 2. 2 Flammability and Detonability Limits of Hydrogen Sulphide

A study is under way to measure the flammability and detonability limits of hydrogen sulphide.

In the event of a release of hydrogen sulphide gas from a heavy water production plant, current operating procedures call for the deliberate ignition of the cloud. The appropriateness of such a procedure is being evaluated as part of the on-going review of heavy water production plants, and for that evaluation it is necessary to know the flammability and detonability limits of hydrogen sulphide.

The results will be used in evaluating the possibility of an unconfined vapour cloud explosion of a released cloud of hydrogen sulphide.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$110K	$46K			$156K

S.A.: D.J. Martin
Category: 1

Source: SED
Contact: L. Truong

3. Uranium Mines and Mills

84. 3. 3 Bioassay Techniques for Saskatchewan Mine and Mill Workers

It is proposed to determine the adequacy of the air sampling, lung burden determination and bioassay techniques currently used to provide quantitative information on the intakes, retention, and excretion of uranium among Saskatchewan mine and mill workers. This field study will be conducted at a number of mine/mill sites in Saskatchewan.

This work is proposed because findings from a similar project conducted in the Elliot Lake region may not be applicable to mines and mills in Saskatchewan. It is likely that there are more "Y" class uranium compounds at the Saskatchewan facilities than at the Elliot Lake facilities (which were found to be predominantly "D" class) because of differences in drying temperatures used in the two types of facilities.

It is anticipated that this work will be used to assess the value of monitoring the excretion of uranium in the urine of personnel exposed to uranium dust, as a correlated indicator of uranium lung burden, and air intake.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$50K	$60K		$110K

S.A.: P.J. Duport
Category: 1

Source: UMD
Contact:

84. 3. 8 Stratified Random Sampling of Radon Daughter Concentrations

It is proposed to implement a stratified random sampling program for radon daughter concentrations at a uranium mine and to compare through side-by-side measurements the estimates of radon daughter exposures for underground mine workers using: a) conventional "grab sampling" and b) stratified random sampling (ref. INFO-0038). Comparative cost estimates for both sampling strategies will be determined.

This work is proposed because present estimates of radon daughter exposures are obtained using grab samples of radon daughter concentrations in the mine environment taken on fixed days, times and locations. This type of procedure will likely introduce bias in the sampling. The high variability of the radon daughter concentrations suggests that a stratified random (i.e. unbiased) sampling technique will provide better estimates of radon daughter exposure.

It is anticipated that the findings of this work will provide guidance to, and will assist the AECB in the assessment of monitoring programs submitted by, uranium mine licensees.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$70K			$70K

S.A.: E. Rabin
Category: 1

Source: UMD
Contact:

84. 3.12 Investigation of the Causes of Violent Deaths among Miners

It is proposed to investigate the causes of workplace- and lifestyle-related excess violent deaths among miners, including uranium miners, in Ontario.

The study is proposed because Phase I of the Ontario Miners Mortality Study identified "violent deaths" as the most serious category of deaths among miners, a conclusion which suggests that further investigation be carried out into their causes.

The results of the study will be used by the appropriate authorities to take corrective action to minimize violent deaths among Ontario miners. (This is expected to be a joint study with Ontario Ministry of Labour, Workers' Compensation Board of Ontario and Mines Accident Prevention Association of Ontario. The AECB is expected to have a minor role in this project.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$20K			$20K

S.A.: V. Elaguppillai
Category: 2

Source: RRB
Contact:

84. 3.20 **Statistical Analysis of the Distribution of Miners' Radiation Exposure Data**

It is proposed to determine the statistical distribution of radiation exposures of uranium mine and mill workers obtained from area and personal dosimetry data. Distribution parameters will be determined for every specific hazard (radon daughters, thoron daughters, radioactive long-lived dust, gamma radiation), for specific site and occupation, and will be related to uranium production rate, ore grade, ore body characteristics, mining techniques and safety practices, where available.

This study is proposed for the purpose of analyzing the large amount of dosimetry data collected on uranium workers in order to identify and quantify the relationships that exist among the work environment, safety techniques, job classifications and individual exposures.

It is anticipated that the results of this study will provide information regarding the implications of applying the concept of effective dose equivalent to the distribution of doses in uranium mining and milling populations. The knowledge of the parameters that affect individual exposures will guide the selection of safety practices in existing facilities and the design of new ones with optimized radiation protection features.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$60K			$70K

S.A.: P.J. Duport
Category: 1

Source: RRB
Contact:

84. 3.21 Cost-Benefit Analysis of Personal Alpha Dosimetry in Mines

It is proposed to fund the ongoing cost-benefit analysis of the use of personal monitors for airborne radioactivity in uranium mines and mills, based on the present Canadian personal alpha dosimetry experimental program. This study will focus on the major radioactive airborne hazards: radon and thoron (daughters and gases) and long-lived dust.

This study is proposed because the use of personal alpha monitors for airborne radioactive hazards is an alternative to the present area monitoring-based dosimetry practices. However, the cost of operating this potentially more accurate dosimetry technique has yet to be evaluated and compared with that of current methods. Gains in accuracy based on personal dosimetry data, potential for optimization of radiation protection and changes in the requirements for radiation protection personnel have also to be evaluated.

It is anticipated that the findings of this study will provide guidance to the AECB staff when evaluating mine and mill licensees' proposals for personnel dosimetry.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$30K			$40K

S.A.: P.J. Duport
Category: 1

Source: RRB
Contact:

85. 3. 1 Effect of Water Sprays on Airborne Radiocompound Concentrations

It is proposed to evaluate, in situ, the effect of the use of water sprays (to wet muck after blast, to wash down back and side walls, and to control dust on roadways) on radon daughter and long-lived radioactive dust concentrations in the underground mine atmosphere.

This study is being proposed because quantitative information is required on the efficacy of water sprays as a radiation protection measure in underground uranium mines.

It is anticipated that the findings of this study will enhance the AECB's knowledge of parameters which affect the radiological conditions of an underground uranium mine environment.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$50K	$20K		$70K

S.A.: E. Rabin
Category: 3

Source: UMD
Contact:

85. 3. 3 **Assessment of the Performance of Personal Radon Daughter Dosimeters**

It is proposed to carry out an assessment of the past performances of personal radon daughters dosimeters, based on Canadian and world-wide experience with them. This will be done by means of a critical review of the relevant literature and by interviews with scientists, engineers, first-line supervisors and miners themselves.

The assessment will provide the basis for a forthcoming AECB staff review of the performance characteristics and advantages and disadvantages of personal radon daughters dosimeters (both active and passive) covering their development and use in uranium mines, in other mines and in other applications over the past decade.

It is anticipated that this study will, in addition to the technical assessment, make recommendations on whether further R & D financial support (by the AECB or other government agencies) of personal radon daughter dosimeters is warranted and should continue and, if so, in what specific technological areas. The study and later staff review will also provide guidance to the Uranium Mine Division on the degree to which personal radon daughter dosimeters should be used by licensees for individual exposure estimation of workers in Canadian uranium mines and mills or whether they should be used at all.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$60K			$60K

S.A.: E. Rabin
Category: 1

Source: RRB
Contact:

85. 3. 4 Electrostatic Purification of Uranium Mine Stope Atmospheres

It is proposed to assess, by means of a critical review of the literature, the feasibility of purifying underground mine air of radioactive aerosols by means of electrostatic precipitation.

This study is proposed because it is not always possible (due to logistic and economic factors) to bring radon- and radon daughter-free air to some work locations. Since the contribution to the miners' lung dose from radon is small compared to that from radon daughters, it is sufficient to remove the radon daughters from the air to reduce significantly individual exposures. This can be achieved by removing airborne particulates by means of industrial electrostatic precipitators. (Such devices would also remove thoron daughters.) Information is required on the practicality of the use of precipitators in Canadian underground uranium mines.

It is anticipated that this study will provide information relevant to achieving improved control of radon daughters in the workplace environment.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$20K			$20K

S.A.: E. Rabin
Category: 1

Source: RRB
Contact:

85. 3. 6 **Physical Characterization and Solubility Study of Airborne Long-Lived Dust in Uranium Producing/Manufacturing Facilities**

It is proposed to determine experimentally the air concentration, the activity size distribution and the solubility of airborne uranium-bearing aerosols in all Canadian uranium mines, mills, refineries and fuel fabrication plants.

This work is proposed to quantify the hazard presented by airborne radioactive long-lived materials in the concerned facilities. The parameters necessary to calculate the committed effective dose equivalent from exposure data must be determined (activity air concentration, size distribution, radionuclide make-up and dissolution rate in simulated lung fluid) in order to evaluate quantitatively this specific radiation hazard.

It is anticipated that this study will indicate the magnitude of the long-lived dust risk in uranium producing/manufacturing industries. It will also likely aid in substantiating any forthcoming regulation and will facilitate interpretation of bioassay data for the purpose of radiation protection of the workers at these facilities.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$100K	$60K		$170K

S.A.: K.P. Ho
Category: 1

Source: UMD, FHWPD, RPD
Contact:

4. Other Fuel Cycle Facilities

84. 4. 1 Demonstration of the Feasibility of Directly Dating Quartz

Using samples of quartz of known date it is proposed to examine the feasibility of directly dating the samples using a technique involving electron spin resonance.

In selecting the site for any nuclear facility it is important to know whether or not the earth's crust in the vicinity of the proposed site is relatively stable. The presence of earthquakes is an obvious indicator of instability. However, some seismically active areas have been known to be quiescent for as long as 2000 years before major seismic activity was renewed yet, in Canada, earthquake records go back only 450 years. To help obtain a more accurate estimate of the tectonic conditions, the minimum age of the youngest fault movement should be known.

If the results of using electron-spin resonance to date quartz are positive then the intention would be to indicate to licensees, in the form of guidelines, that, where appropriate, fault-filling quartz be dated.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$30K			$30K

S.A.: J.L. Wallach
Category: 1

Source: RRB
Contact:

84. 4. 3 Transfer Coefficients in the Feed/Poultry/Egg Pathway

It is proposed to continue a project in which concentration factors for selected radionuclides are being determined for the feed/poultry/egg pathway.

At present, concentration factors for this pathway are few. Those that are used in such submissions to the AECB as derived release limit calculations have been produced from only a small set of measurements.

These data and concentration factors, as well as related information gained from doing this project, will be used in evaluating the validity and reliability of derived release limit estimations or any other submissions to the AECB where doses to humans have been estimated from pathways analysis.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$40K	$30K			$70K

S.A.: R.J. Maloney
Category: 1

Source: RPD
Contact: M. Measures

84. 4.10 Determination of Concentration Factors - Game Animals

It is proposed to complete the determination of concentration factors in the soil/forage/moose pathway for selected radionuclides of the uranium and thorium decay chains.

As moose form part of the diet of some people in the Elliot Lake region, there is a need to know the concentration factors for this pathway. Currently, concentration factors for this food/animal pathway are not available and there is no information as to the significance of the contribution of this pathway to dose.

The data and concentration factors, as well as the related information gained from this project, will be used in evaluating the validity and reliability of derived release limit estimations or any other submissions to the AECB where doses to humans have been estimated from pathways analysis.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$10K			$40K

S.A.: R.J. Maloney
Category: 1

Source: RPD
Contact: C. Letourneau

84. 4.11 Determination of Concentration Factors - Domesticated Animals

It is proposed to continue with the determination of concentration factors for selected radionuclides in the ingestion to beef and inhalation to milk pathways.

Concentration factors for the feed to beef pathway and the air to milk pathway either do not exist or have not been determined from statistically significant numbers of samples. Because of this lack of information, dose calculations are made using default values that in some cases are based on a single measurement, or are the mean of results that range over two orders of magnitude. Furthermore, in the inhalation pathway some licensees have assumed that the ratio of uptake following the inhalation of contaminated air to uptake following ingestion of radionuclides by dairy cattle is the same as that in humans. Making this assumption and using default values introduce large uncertainties into pathways analyses. In addition, preliminary calculations indicate that: a) the beef pathway may be as important as the milk pathway in contributing to human dose; and b) that the inhalation pathway may be as important as the ingestion pathway in the contamination of milk with radionuclides. Thus there is a need to verify and quantify both of these preliminary observations.

The data and concentration factors, as well as the related information gained from the project, would be used in evaluating the validity and reliability of derived release limit estimations or any other submissions to the AECB where doses to humans have been estimated from pathways analysis. The data would also be used to ensure that all important pathways have been identified.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$40K			$70K

S.A.: R.J. Maloney
Category: 1

Source: RPD
Contact: M. Measures

84. 4.17 Transfer of Radionuclides from Food to Human Milk

It is proposed to determine the concentration factors for radium, thorium, strontium and iodine in the food-human milk pathway.

At present, concentration factors for this pathway are practically non-existent. Those that are used in licensee submissions, such as in derived release calculations, have been produced from only a small set of measurements. The information gathered by this project will aid in determining the validity of currently used concentration factors and provide an indication of their reliability.

These data and concentration factors, as well as the information gained from doing this project, will be used in evaluating the validity and reliability of derived release limit estimations or any other submissions to the AECB where doses to humans have been estimated using this pathway.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$100K			$130K

S.A.: R.J. Maloney
Category: 2

Source: RPD
Contact: C. Letourneau

84. 4.19 The Quantification of Risk and Benefit

It is proposed to continue with a project which will survey the literature and summarize the ways in which risk and benefit can be quantitatively expressed in the context of licensing nuclear facilities. In addition, the contractor will provide a discussion of the implications, advantages and disadvantages of each method of quantification.

The AECB requires information which would allow comparison of disparate risks, such as those posed by nuclear reactors and heavy water plants. In order to be able to compare disparate risks, a suitable "index of risk/benefit" would be invaluable. This project is one step in the direction of assembling relevant information for the development of such an index.

The results of the study would be used in the development of a method for comparing disparate risks, with a view to seeking a self-consistent method of evaluating risks and their associated benefits.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$20K			$30K

S.A.: D.J. Martin
Category: 1

Source: RRB
Contact:

85. 4. 1 Development of Convenient, Reliable Extremity Dosimeters

It is proposed to assess the design and use of currently available extremity dosimeters and to make recommendations for improvements with respect to convenience for wearing, and for obtaining more reliable and meaningful measurements of extremity exposures.

This work is proposed because fuel fabrication facilities have expressed dissatisfaction with existing extremity dosimeter designs, the reliability of such dosimeters and the significance of the exposures recorded.

It is anticipated that the findings and recommendations of this work will be useful to the design of extremity dosimeters. Improved dosimeter designs will result in better exposure information being obtained from refinery and fuel fabrication plant workers.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$30K			$30K

S.A.: E. Rabin
Category: 1

Source: FHWPD
Contact:

85. 4. 4 A Review of Financial Assurance Mechanisms

A project is proposed which would survey currently available methods for providing financial assurance relating to the costs of decommissioning nuclear facilities.

The AECB wishes to ensure that funds are available to pay the costs of decommissioning nuclear facilities. As yet, it is not clear which method or combination of methods is appropriate for the various nuclear facilities.

The results of the study would provide guidance to the AECB in developing appropriate requirements for financial assurance mechanisms which are tailored to specific nuclear facilities.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$40K			$40K

S.A.: D.J. Martin
Category: 2

Source: WMD
Contact: M.C. White

85. 4. 6 The Quantification of Risk and Benefit (II)

A project is proposed which would require the contractor to devise various methods for the quantification of risk and benefit in the context of deciding the acceptability of nuclear facilities. In addition, the contractor would be required to present a methodology for validating the methods of quantification.

The AECB requires information which would allow comparison of disparate risks, such as those posed by nuclear reactors and heavy water plants. The proposed study would continue to develop an approach to the establishment of a suitable risk/benefit scale for assessing risks and their associated benefits.

The results of the study would be used in the development of a method for comparing disparate risks and their associated benefits.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$60K			$60K

S.A.: D.J. Martin
Category: 2

Source: RRB
Contact:

85. 4. 9 Factors Affecting Soil-Plant Transfer Parameters

It is proposed to carry out field studies to determine the manner in which selected environmental factors affect the soil to plant transfer of selected radionuclides.

Mineral and radionuclide uptake by plants are affected by many environmental factors, such as soil acidity, soil texture, humus content and temperature. The degree to which these factors affect the radionuclides may also be dependant on the type of plant. There is a need to determine the significance of the effects these factors have on the soil-plant transfer parameters.

The results of this study will be used to determine the appropriateness of default transfer parameters used in pathways analyses, such as derived release limit calculations, submitted to the AECB in compliance with license conditions. The possibility of making this a joint project with Agriculture Canada is being investigated.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$40K	$40K		$80K

S.A.: R.J. Maloney
Category: 1

Source: RPD
Contact: C. Letourneau

85. 4.10 Geological Evidence of Seismicity - Charlevoix

It is proposed that field investigations be undertaken in the Charlevoix, Quebec, earthquake area to look for, document, and evaluate land forms, structures in unconsolidated sediments, and changes in sedimentary layers which have been identified elsewhere and have been interpreted as being genetically associated with earthquakes.

This study is proposed because the Charlevoix area has been the site of some of eastern Canada's largest earthquakes, yet not studies have been conducted there to look for geological evidence of these events. Therefore, this study, if successful, will provide geological information to supplement the existing seismic data and enable evaluating the nature and periodicity of both historic and pre-historic earthquakes. Because of the coexistence of geologic and seismic data, it would also provide information for estimating seismic risk in areas being considered for nuclear facilities. The study which would cost a total of $175K over three years would be carried out in conjunction with the Geological Survey of Canada and the Earth Physics Branch which invests approximately $3 million annually in seismic related studies.

The results of this study are intended to be used both in the formulation of guidelines to licensees and for evaluating information from licensees regarding estimates of seismic risk to nuclear facilities.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$25K	$25K	$30K	$80K

S.A.: J.L. Wallach
Category: 1

Source: RRB
Contact:

85. 4.11 Evaluating Geological Folds in Southern Ontario

It is proposed to gather data on the orientation and nature of folds in the sedimentary rocks in southern Ontario in order to attempt to identify those which may be geologically very young and associated with the regional stresses responsible for rock bursts and earthquakes in eastern Canada.

This study is proposed because if such folds are identified they should provide a reasonable indication of where to look for potential or actual, tectonically active faults in southern Ontario.

The results of this study are intended to provide better information than currently exists for evaluating seismic risk to nuclear facilities. The study, which would cost approximately $100K over two years, would involve the participation of the Geological Survey of Canada and the Ontario Geological Survey.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$20K	$15K		$35K

S.A.: J.L. Wallach
Category: 1

Source: RRB
Contact:

85. 4.12 Diet of Canadian Native Peoples

It is proposed to conduct a survey of on the diets of Canadian native peoples living in the vicinity of uranium mines and mills.

Diet information presently used for dose calculations represents the "average" Canadian diet; however this information does not necessarily reflect the diets of Canadian native peoples living in northern Ontario and northern Saskatchewan. There is a need to determine what diets should be used in pathways analyses and subsequent dose calculations.

The results of this survey would be used to determine what diets should be used in dose calculations and derived release limit estimations for uranium mine and mill facilities in Canada.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$15K			$15K

S.A.: R.J. Maloney
Category: 1

Source: RPD
Contact: M. Measures

85. 4.14 Stress Measurements in Eastern Ontario - Phase II

It is proposed to continue the work done in 1984/85, by deepening three existing holes at the Roblindale quarry and measuring stresses in the underlying Precambrian.

This study, also to be conducted in cooperation with Ontario Hydro at a cost of about $50K, is proposed to determine if the stresses in the Precambrian rocks there differ from the stresses in the overlying rocks as they do at Darlington. Additional studies in future years may bring the total cost to about $250K.

The results of this study are intended to provide additional information on regional tectonic conditions as well as to indicate whether or not the stress conditions beneath the Darlington Generating Station are unique. If the results from Roblindale suggest that the stress conditions are Darlington are unique, then there may be a need to re-evaluate the geological conditions relevant to Darlington.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$20K	$20K	$20K	$30K	$90K

S.A.: J.L. Wallach
Category: 1

Source: RRB
Contact:

5. Waste Management

84. 5. 5 Impact of Radiation on Containment in Waste Disposal

A project is under way to assess the effects of radiation on all components of the deep geological disposal system which are likely to be affected by radiation.

This is being done through a study of available data, and emphasis being placed on the near-field components: the waste-form, canisters, buffer and backfill materials and the host rock. Following the assessment of the effects, the likely impact of radiation on the effectiveness of a deep disposal system will be examined.

It is anticipated that the results of this study will be used in developing guidelines and evaluating submissions to the Board, most particularly those addressing the design of the deep geological repository and its contents.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$15K	$30K			$45K

S.A.: J.L. Wallach
Category: 1

Source: WMD
Contact: P.J. Conlon

84. 5. 7 The Retention Capabilities of Rocks

It is proposed to continue this project to determine whether there is sufficient information in the literature to enable an estimate to be made, for at least one ore body, what percentage of the original ore body is still in place after depletion through natural processes.

This work is intended to provide a basis for assessing the potential for natural geological systems to contain radioactive wastes.

Information from this study is expected to enhance the capability of AECB staff in evaluating documentation related to the concept of deep geological disposal currently being considered in Canada.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$5K			$15K

S.A.: J.L. Wallach
Category: 1

Source: RRB
Contact:

84. 5. 9 The Impact of Vertical Crustal Movements on Deep Disposal

It is proposed to continue to evaluate, through a survey of the literature, whether sufficient information is available to determine the effects that vertical crustal movements may have on subsurface rock and groundwater systems associated with a deep geological disposal facility.

As the earth's crust is uplifted it is suspected that new fractures may develop or old ones may re-open and, as a result, groundwater conditions may change. The result of this work will help assess what impact these effects may have on the ability of an underground system to adequately contain radioactive waste.

It is expected that the results of this study will augment the capabilities of AECB staff in the evaluation of the concept assessment phase of the deep disposal program.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$10K			$20K

S.A.: J.L. Wallach
Category: 1

Source: WMD
Contact: P.J. Conlon

84. 5.13 A Review of Subsurface Hydrogeologic Conditions

It is proposed to continue with the next phase of this project to review and interpret all available information on groundwater flow generated during studies relevant to the deep disposal of radioactive waste.

This study is a follow-up to the study entitled "A Review of Hydrogeology Research Techniques" and, together with that study, will provide information which will keep the AECB apprised of the most up-to-date information in the area of hydrogeology.

It is anticipated that this information will help AECB staff in evaluating the deep disposal program by providing independent information on groundwater conditions. It is also anticipated that the results would be useful in writing guidelines.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$15K	$30K			$45K

S.A.: J.L. Wallach
Category: 1

Source: RRB
Contact: P.J. Conlon

84. 5.14 Hydrogeological Factors to Be Addressed in Guidelines

It is proposed to continue to identify those properties of groundwater and the conditions affecting groundwater flow which should be evaluated in determining the suitability of a site and region for the deep underground disposal of radioactive waste.

This study is intended to provide a perspective, independent of that held by AECB staff, which will ensure that AECB staff have not overlooked any relevant hydrogeological factors.

It is anticipated that this information will be used to modify existing guidelines or to write additional guidelines pertaining to the hydrogeological aspects of the deep disposal program.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$10K	$25K			$35K

S.A.: J.L. Wallach
Category: 1

Source: RRB
Contact: P.J. Conlon

84. 5.15 Shallow Ground Disposal - Calculation of Dose

It is proposed to continue with the modification of a computer program and to calculate the doses that could result from various combinations of waste in different conditions of shallow ground disposal.

No suitably flexible program package was available with which to assess the performance of shallow disposal facilities.

This work will aid AECB staff in assessing license applications relating to the shallow disposal of radioactive waste. The model will also be used in determining what wastes might be suitable for disposal in shallow ground facilities.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$70K			$100K

S.A.: R.J. Maloney
Category: 1

Source: WMD
Contact: K.P. Wagstaff

85. 5. 1 Radionuclide Content of Waste Packages - A Survey of Methods

This project will survey and evaluate methods currently used nationally and internationally in nuclear facilities to determine the inventories of radionuclides in waste packages destined either for storage or disposal.

This project has been proposed as part of an on-going effort to aid the AECB staff in their daily licensing activities by keeping their knowledge as current as possible.

The information gained by this project will be used by the AECB staff to assess present and proposed practices for characterizing the contents of waste packages.

Past	FY 84/85	FY 85/86 $5K	FY 86/87	Future	Total $5K

S.A.: R.J. Maloney
Category: 1

Source: WMD
Contact: P. Conlon

85. 5. 3 Survey of Computer Codes for Flow and Contaminant Transport

It is proposed to select and develop a two-dimensional, finite-element computer code for the calculation of groundwater flow and radionuclide transport through saturated and unsaturated porous media as found in mine tailings management areas or shallow surface waste storage and disposal sites.

Commercially available finite-element computer codes analyzing seepage through earthworks are primarily designed for stress analysis. Modification of these codes for flow and contaminant transport introduces difficulties. In addition, the cost of performing sensitivity analyses on transient models is prohibitive. Thus there is a need to review and evaluate existing models and select one for modification and use on the HP-1000 computer.

At the present time AECB staff are reviewing three licensing submissions which involve the modelling of radionuclide migration. The model selected and developed under this project would enable the AECB staff to perform their own independant calculations and thus be in a much better position to assess the approaches and results contained in the submissions. In addition the model which is selected and developed could be used as one of the components of the models being developed in a concurrent project, "Shallow Ground Disposal - Calculation of Dose."

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$35K	$35K		$60K

S.A.: R.J. Maloney
Category: 1

Source: SED
Contact: G.J.K. Asmis

85. 5. 4 Morro do Ferro - A Natural Analogue for Uranium Tailings?

It is proposed to evaluate, in consultation with the staff of the National Uranium Tailings Program, information on the Morro do Ferro, Brazil, thorium deposit to determine whether or not this deposit has the potential to be a suitable natural analogue for a uranium tailings "disposal" site.

This study is proposed because if this deposit is a potentially suitable analogue, well-defined studies of Morro do Ferro should provide useful information for modelling long-term radionuclide migration from a near-surface uranium mill tailings pile in Canada from which all institutional controls have lapsed.

The results of this study will enable AECB staff either to abandon the idea of using Morrodo do Ferro or to define a study which could be pursued under the auspices of the National Uranium Tailings Program and to which the AECB could contribute.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$10K	$15K		$25K

S.A.: J.L. Wallach
Category: 2

Source: RRB
Contact: B. Zgola

85. 5. 5 The Quantification of Uncertainty in Probabilistic Modelling

It is proposed to continue studies begun in FY 84/85 on the quantification of uncertainty in probabilistic modelling. Detailed analyses of certain key sources of uncertainty would be undertaken.

The licensing of long-term nuclear waste disposal facilities is based on the predictions of computer models. Clearly, the limitations or uncertainties of the model predictions must be known in order to evaluate the credibility of the predictions.

The results of the contract would be used in the evaluation of the confidence with which the model predictions can be viewed and to assist in the formulation of appropriate regulatory criteria for assessing model predictions.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$40K			$70K

S.A.: D.J. Martin
Category: 2

Source: RRB
Contact:

6. Non Fuel Cycle Applications

84. 6. 8 Neutron Dosimetry for Oil-Well Logging Operations

It is proposed to provide funding for this ongoing project to irradiate personal neutron dosimeters that incorporate both NTA film and CR-39, using the neutron fields encountered in oil-well logging operations, and to compare and evaluate the response of the two detector materials.

This work is proposed because of the difficulty of interpreting quantitatively readings from the NTA detectors at low exposure levels.

It is anticipated that the results of this research will be used, in conjunction with other information, to make decisions on licensees' requests for modifying their dosimetry practices (e.g., subscription to a neutron dosimetry service).

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$2K	$8K			$10K

S.A.: E. Rabin
Category: 1

Source: RTD
Contact:

85. 6. 1 To Develop a New Personal Neutron Dosimeter - Phase III

It is proposed to provide funding for an ongoing project to study and assess the bubble-damage polymer detector for neutron radiation. Funding for this project began in FY 83/84 and is anticipated to continue to the end of FY 86/87. The work to be funded in each of FY 85/86 and FY 86/87 will depend upon the findings of the previous year's research. This project is also receiving financial support from AECL (the contractor) and is expected to receive support from Canadian Fusion Fuels Technology Project (CFFTP).

This work was initiated because no single existing neutron dosimeter is considered to be acceptable for monitoring neutron radiation in a variety of different environments where neutron radiation can occur (e.g., particle accelerators, reactors, etc.). The detector in this work shows promise because it is simple to use, compact, direct reading, very sensitive to neutron radiation, insensitive to gamma radiation and probably capable of detecting neutron radiation in the keV energy range and lower.

It is anticipated that this work will stimulate the development of a personal neutron dosimeter for radiation protection purposes that is superior to currently-used personal dosimeters. (Board approval was obtained for FY 84/85 at the Board meeting on November 19, 1984 (BMD 84-162), and approval in principle was obtained for later phases for FY 85/86 and FY 86/87.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$33K	$65K	$50K	$50K		$198K

S.A.: E. Rabin
Category: 1

Source: RRB
Contact:

85. 6. 2 Radiological Significance of Working with Damaged Depleted Uranium Castings

It is proposed to measure the radiation field at maintenance workplaces and to evaluate the radiological significance to individuals, such as those in aircraft maintenance who work with depleted uranium castings, on which the protective plating or cladding has been damaged or has deteriorated with age.

This work is proposed to determine the radiological significance of working with damaged or deteriorated depleted uranium castings. It should reveal whether or not the external radiation hazard and the risk of inhaling radioactive dust is increased when the plating or cladding is not intact.

It is anticipated that the findings of this project will be incorporated into a Code of Practice for the handling of depleted uranium on which the plating or cladding has deteriorated or has been damaged.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$50K			$50K

S.A.: K.P. Ho
Category: 2

Source: FHWPD
Contact:

8. Health Physics

84. 8. 1 Epidemiological Study of Childhood Genetic Disorders

It is proposed to fund the ongoing epidemiological study of childhood genetic disorders in British Columbia. Genetic disorders among nearly 60,000 live birth cohorts from 1952 to 1982 will be analyzed using the most recent classification codes.

This proposal is an update of an earlier British Columbia study which was used extensively by UNSCEAR for risk estimates for genetic disorders. Substantial amounts of data on childhood genetic disorders have been accumulated since the last study was conducted more than a decade ago.

The results of the study are expected to improve the risk estimates for radiation-induced genetic disorders.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$50K	$30K			$80K

S.A.: V. Elaguppillai
Category: 1

Source: RRB
Contact:

84. 8. 2 Cost of Reducing Occupational Risk in Canadian Industries

It is proposed to fund the ongoing project on the assessment of costs incurred by Canadian nuclear and non-nuclear industries to reduce occupational injuries, diseases and death, both conventionally and radiologically induced, where applicable.

In order to facilitate the application of differential cost-benefit analysis to the optimization of radiation protection, a value is needed for the minimum amount that should be spent for unit reduction in dose. This minimum amount, expressed, for example in dollars per person-sievert, is commonly called "alpha". "Alpha" values have been derived by other countries from assessments of how much society tends to spent to reduce risk in various activities, and it is now desired to obtain a value for "alpha" based on Canadian data.

The "alpha" value will be used to make a judgement on dose-reduction expenditures in the nuclear industry.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$60K			$90K

S.A.: E. Rabin
Category: 1

Source: RRB
Contact:

84. 8. 4 Ontario Miners Mortality Study - Phase II

It is proposed to fund the ongoing investigation of the cause of excess lung cancer among gold miners, to update the mortality analysis for Ontario uranium miners for the period from 1977 to 1981, and to re-evaluate the risk of lung cancer per unit exposure.

This is an extension of the Phase I study where excess lung cancer among gold miners was identified, and further investigation of the cause was recommended. Because several uranium miners had previous gold mining experience, it is also necessary to investigate the contribution of gold mining experience on lung cancer incidence among uranium miners.

The results of the study will be used to improve the risk estimates for radiation-induced lung cancers. (A joint study with the Workers' Compensation Board of Ontario and Ontario Ministry of Labour.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$59K	$55K	$45K			$159K

S.A.: V. Elaguppillai
Category: 1

Source: RRB
Contact:

84. 8. 5 Newfoundland Fluorspar Miners Mortality Study

It is proposed to fund the ongoing mortality analysis of Newfoundland fluorspar miners by extending the mortality analysis from 1978 to 1981 and by examining the smoking and dietary histories of the miners.

This study is proposed in order to extend the mortality analysis from 1978 to 1981, and to allow the use of revised exposure estimates to calculate the risk of lung cancer from radon daughter exposure. The revised risk estimates will also take smoking and dietary factors into account.

It is anticipated that the study will improve the risk estimates for lung cancer among miners exposed to radon daughters. (A joint study with Statistics Canada and Health and Welfare Canada.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$83K	$40K	$25K			$148K

S.A.: V. Elaguppillai
Category: 1

Source: RRB
Contact:

84. 8. 6 Ontario Miners 'Alive' Follow-Up Feasibility Study

It is proposed to fund the ongoing feasibility study of 'alive' follow-up of Ontario miners, by using available information from Canadian income tax data, Canada Pension Plan records and other suitable files.

This study is proposed because of the need to examine the uncertainties involved in 'alive' assumptions using various data files. In an occupational mortality study, names of persons in nominal rolls are usually matched against the names in the Mortality Data Base to ascertain deaths. Those who are not matched are usually assumed to be 'alive', and there may be some uncertainties in this assumption because some of these assumed 'alive' persons might have died outside the country or been lost for follow-up.

The results of the study are expected to improve the quality of death searches in occupational mortality studies and hence the risk estimates for radiation-induced cancers. (A joint study with Statistics Canada, Ontario Ministry of Labour and Workers' Compensation Board of Ontario.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$43K	$45K	$25K			$113K

S.A.: V. Elaguppillai
Category: 1

Source: RRB
Contact:

84. B. 7 Epidemiology of Lung Cancer Mortality in Canadian Mining Communities

It is proposed to fund the ongoing case-control pilot study of lung cancer deaths in uranium and non-uranium mining towns across Canada in which lung cancer mortality has been shown to be significantly elevated.

The study is proposed in order to attempt to find out to what extent various factors in the home and the workplace were responsible for excess cancer among miners and other residents of mining communities.

It is anticipated that the results of this study will be used to improve risk estimates for radiation-induced lung cancers. (A joint study with Statistics Canada and Health and Welfare Canada.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$12K			$42K

S.A.: P.J. Duport
Category: 1

Source: RRB
Contact:

84. B. 8 Study of Health Effects on Central Nervous System following In Utero Exposure to Ionizing Radiation

It is proposed to fund the ongoing study of the effects on the central nervous system of experimental animals following in utero exposure to ionizing radiation at different stages of gestation.

It is anticipated that an increasing number of young women will seek employment in the Canadian nuclear industry, where, in some cases, exposure of embryos or fetuses might occur. Very little information is available in the literature about the effect of in utero irradiation on the function and structure of the brain, and the proposed study will help in the understanding of the problem.

The results of the study will be used to improve risk estimates for radiation-induced developmental defects. (This project was approved by the Board at the meeting held on September 24, 1984, BMD 84-133.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$18K	$75K	$55K		$148K

S.A.: V. Elaguppillai
Category: 1

Source: RRB
Contact:

84. 8. 9 Ontario Miners SIN Evaluation Study

It is proposed to fund the ongoing investigation on the effectiveness of the use of supplementary information from the Social Insurance Number data file in the analysis of occupational mortality among miners.

The study should indicate whether or not the use of SIN information would substantially improve the number of successful linkages of mortality and hence the accuracy of epidemiological studies.

It is anticipated that the results of the study will be used to improve the risk estimates for radiation-induced cancer mortality among various occupationally exposed groups. (A joint study with Statistics Canada and Ontario Ministry of Labour.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$28K	$40K	$5K			$73K

S.A.: V. Elaguppillai
Category: 1

Source: RRB
Contact:

84. 8.10 The Canadian National Dose Registry Study

It is proposed to provide funding for the ongoing project to conduct an epidemiological study of cancer mortality among some 300,000 Canadians occupationally exposed to low levels of ionizing radiation, by developing a suitable linkage between the Canadian National Dose Registry and the Canadian Mortality Data Base.

This study is intended to find out whether there is any excess cancer mortality among certain groups of workers, such as Nuclear Medicine Technicians and Radiographers, who have not been studied so far in sufficient detail. This study of 300,000 radiation workers is likely to provide further information towards a better understanding of the dose-response relationship for low doses of ionizing radiation.

It is anticipated that the results of this study will be used to verify risk estimates for radiation induced cancer mortality. (A joint study with Health and Welfare Canada and Statistics Canada.) (Board approval has been obtained September 24, 1984, BMD 84-128.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$5K	$50K	$50K	$50K	$50K	$205K

S.A.: P.J. Duport
Category: 1

Source: RRB
Contact:

84. 8.11 Study of the Health Effects of Inhaled Radioactive Dust

It is proposed to provide funding for the ongoing project to study the health effects (cancer mortality and histological defects) on experimental animals exposed to different concentrations of long-lived radioactive dust, such as those encountered in the uranium mines in Ontario and Saskatchewan.

The study is proposed because Canadian uranium miners are occupationally exposed to long-lived dust (containing uranium, thorium and their long-lived daughters), and the contribution of this exposure to the incidence of cancer is not fully understood.

The results of this study will be used to interpret the health effects of long-lived dust on uranium miners and to develop regulatory guidelines for controlling exposures to long-lived radioactive dust. (Board approval has been obtained September 24, 1984, BMD 84-126.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$45K	$200K	$130K	$225K	$600K

S.A.: P.J. Duport
Category: 1

Source: UMD and RRB
Contact:

84. 8.12 Study of the Distribution of Fatal Risk in "Safe" Industries

It is proposed to fund the ongoing study of the statistical distribution of fatal risk in those Canadian industries which are recognized as having a high standard of safety.

The average risk of radiation exposure in the nuclear industry is often compared with the average fatal risk in non-nuclear industries which are considered to be "safe". However, it is not known whether the ratio of the maximum to the average risk due to radiation is comparable to the corresponding risk ratios in "safe" industries.

It is anticipated that the results of this study would help in judging whether or not the dose limits for radiation workers represent too high an individual risk.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$30K	$5K			$35K

S.A.: E. Rabin
Category: 1

Source: RPD
Contact:

84. 8.13 Epidemiological Study of Thyroid Cancer from I-131 Exposure

It is proposed to fund the ongoing epidemiological study of thyroid cancer among Canadians who were exposed to radioactive iodines during diagnostic examinations.

Risk estimates for radiation-induced thyroid cancer are based on the incidence among those exposed to X-radiation. There is some controversy as to whether or not the same dose of I-131 and X-radiation are equally effective for the induction of thyroid cancer.

The results of the study are expected to refine the risk estimates for radioiodine-induced thyroid cancers, and to determine whether or not equal (thyroid) doses of I-131 and X-radiation are equally effective in the induction of thyroid cancers.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$18K	$42K	$70K			$130K

S.A.: V. Elaguppillai
Category: 2

Source: RRB
Contact:

84. 8.14 Measurement of the Thickness of Bronchial Epithelium

It is proposed to measure the depth of basal cells and the thickness of cilia and mucous layers covering the human epithelium of the tracheo-bronchial region. Measurements of the various parameters will be made in vivo as well as on biopsy and autopsy samples.

The study is expected to improve the accuracy of the various anatomical parameters used in lung dose calculations. Currently available data on the above anatomical parameters are based only on a single study which is known to have many uncertainties.

More accurate parameters obtained from this study are expected to be used in the calculation of lung doses due to inhaled radon and thoron daughters and long-lived radioactive dust.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$45K			$45K

S.A.: P.J. Duport
Category: 1

Source: RRB
Contact:

84. 8.15 Measurement of RBE for Tritium for Myeloid Leukemia

It is proposed to fund the ongoing experimental study of the Relative Biological Effectiveness of tritium beta rays for the induction of myeloid leukemia in animals.

The study is proposed because of the concern as to whether or not a given dose of tritium beta rays is as equally effective as the same dose of chronic 200 kVp X-rays, acute 200 kVp X-rays and chronic Co-60 gamma rays for the induction of myeloid leukemia.

The results of the study are expected to improve the estimate of the quality factor (QF) for tritium beta rays. (A joint study with AECL and Canadian Fusion Fuels Technology Project.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$8K	$65K	$15K		$88K

S.A.: V. Elaguppillai
Category: 2

Source: RRB
Contact:

84. 8.16 Ontario Miners Morbidity Follow-Up Feasibility Study

It is proposed to conduct the ongoing feasibility study of the morbidity follow-up of Ontario miners by linking Ontario miners mortality data with Ontario hospital admission and separation data.

This study is proposed because of the need to determine the feasibility of a full-scale study of the morbidity among Ontario miners.

If feasible, a full-scale study would be undertaken to clarify the role of environmental and occupational factors in the incidence of various diseases among uranium miners, so that timely measures could be taken to minimize any occupational and environmental health risk to the uranium miners. (A joint study with Statistics Canada and Ontario Ministry of Labour.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$15K	$40K			$55K

S.A.: K.P. Ho
Category: 1

Source: RRB
Contact:

85. 8. 1 Quality Assurance for Radiation Dosimetry Services

It is proposed to survey and assess the administrative aspects of quality assurance in health care and related industries in Canada, and to apply this information to the derivation of criteria for dosimetry services that are used to demonstrate compliance with the AEC Regulations and typical licence conditions.

This work is proposed because currently there are no standards or guides for radiation dosimetry practices in Canada against which AECB licensees' practices can be audited.

It is anticipated that the findings of this study will be used to develop standards for radiation dosimetry against which proposed and existing licensees' practices may be audited for verification of their credibility.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$30K			$30K

S.A.: E. Rabin
Category: 3

Source: CQAD
Contact:

85. B. 2 Study of the Size Change of Inhaled Submicron Aerosols

It is proposed to study experimentally the influence of the change of humidity and temperature on inhaled radon and thoron progeny-bearing submicron aerosols as they pass from the open atmosphere through the respiratory system.

The dose delivered to the lung by inhaled radon or thoron progeny is strongly dependent upon the size of the particles. For an identical exposure to radon daughters, the dose to the lung doubles when the particle size decreases from 0.2 to 0.1 micron. Working level month-to-sievert conversion factors found in the literature (ICRP 32, NEA Experts Report on Dosimetry Aspects of Exposure to Radon and Thoron Daughter Products) are based on the assumption that the carrier aerosol has an activity median aerodynamic diameter (AMAD) of 0.15 to 0.3 micron. However, aerosol measurements in uranium mines indicate that radon daughter carrier aerosols generally have an AMAD of 0.1 micron or less. If the change in humidity and temperature which the aerosol encounters when it is inhaled does not affect its AMAD, higher exposure-to-dose conversion factors than those found in the literature should be used.

It is anticipated that the findings of this study will increase the accuracy of dose calculations and will narrow the range of current exposure-to-dose conversion factors.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$60K	$30K		$90K

S.A.: P.J. Duport
Category: 1

Source: RRB
Contact:

85. 8. 3 Comparison of the Rationale Used in Setting Occupational Limits for Radiation and Other Carcinogens

It is proposed to examine the rationale used in setting occupational standards for non-radiological carcinogens and compare it with the rationale used for setting dose limits for ionizing radiation.

The study is proposed because there is a lack of comparative understanding of the rationale and the philosophy behind setting occupational standards for radiological and non-radiological carcinogens at the work place.

It is anticipated that the results of the study will enable the AECB to judge whether or not the dose limits for ionizing radiation are based on a more or less sound rationale than the corresponding limits for non-radiological carcinogens in the workplace.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$35K			$35K

S.A.: E. Rabin
Category: 1

Source: RRB, ACRP
Contact:

85. 8. 4 Epidemiological Study of Childhood Cancers Due to Parental Irradiation

It is proposed to conduct a pilot case-control study to examine the feasibility of a full-scale study of childhood cancers among Canadians.

With the proposed changes in the dose limits for female atomic radiation workers, increasing numbers of young women are expected to seek employment in various activities where they might receive in utero exposures. Since a positive association between childhood cancers (mainly leukemia and brain cancer) and low-level radiation has been reported in some countries, it is important to investigate this relationship among Canadian children and to determine to what extent other maternal factors, such as smoking, dietary pattern and intake of drugs during pregnancy, influence the relationship.

It is anticipated that the results of the pilot study will enable the AECB to determine the feasibility of a comprehensive case-control study. The comprehensive study is expected to result in the improvement of the risk estimates for radiation-induced cancers. (This is expected to be a joint study with Health and Welfare Canada.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$40K	$40K		$80K

S.A.: V. Elaguppillai
Category: 1

Source: RRB
Contact:

85. 8. 5 Identification and Recording of Non-Radiological Carcinogens at Nuclear Facilities

It is proposed to examine the feasibility of identifying and recording occupational exposures to non-radiological substances at Canadian nuclear facilities.

Workers at Canadian nuclear facilities might be exposed to a number of non-radiological carcinogens. These carcinogens and their exposures have not been estimated or recorded in the past. As a result, their influence on the induction of cancers among those exposed to ionizing radiation has not been accounted for in a number of epidemiological studies. Before these carcinogens are properly accounted for in any epidemiological studies, a viable system must be developed to identify them and to record their exposures in the radiation environment.

The results of the study would demonstrate whether or not it is feasible to develop a system to identify and record non-radiological exposures in the workplace. (This is expected to be a joint study with Statistics Canada and AECL.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$45K			$45K

S.A.: K.P. Ho
Category: 1

Source: RRB, AECL
Contact:

85. 8. 6 **Revision of Name Encoding Scheme (NYIIS) for Use by Canadian Epidemiological Studies**

It is proposed to examine the feasibility of revising the currently used name encoding scheme (NYIIS) for Canadian names and phonetics using Ontario miners' mortality data.

A number of epidemiological studies of radiation-induced cancers reveal that 2-10% of mortality searches are lost because the currently used name encoding scheme developed by New York State (NYIIS) is inadequate for certain Canadian surnames. A revised name encoding scheme might therefore be necessary to improve the accuracy of the mortality search.

The results of the study would be used to determine whether or not a revised name encoding scheme should be developed and used in all Canadian epidemiological studies of radiation-induced cancers. (This is expected to be a joint study with Statistics Canada and Ontario Ministry of Labour.)

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$25K			$25K

S.A.: K.P. Ho
Category: 1

Source: RRB, Statistics Canada
Contact:

85. 8. 7 Epidemiological Study of Radiation-Induced Developmental Defects among Canadians

It is proposed to conduct a pilot study to examine the feasibility of a full-scale epidemiological study of developmental defects among Canadians who received in utero irradiation. (Cancer is not considered to be a developmental defect.)

With the proposed revision of dose limits for female radiation workers increasing numbers of young women are expected to seek employment in the nuclear industry and in other activities where exposure of an embryo or fetus might occur. This exposure might result in increased incidence of radiation-induced developmental defects. The currently available risk estimate of 10^{-1} per Sv for developmental defects has a number of uncertainties and, therefore, further studies are needed. No comprehensive epidemiological study has ever been undertaken in Canada to obtain additional information which would improve the risk estimates for radiation-induced developmental defects.

The results of the study would enable us to determine the feasibility of a full-scale study. Such a full-scale study, if it is feasible, might result in the improvement of risk estimates for radiation-induced developmental defects.

Past	FY 84/85	FY 85/86 $40K	FY 86/87	Future	Total $40K

S.A.: V. Elaguppillai
Category: 2

Source: RRB
Contact:

85. 8. 8 Comparison of the Techniques Used in Estimating Past Exposures to Radon Daughters in Canadian Mines

It is proposed to examine and compare the techniques used to evaluate past exposures to radon daughters in various Canadian uranium and non-uranium mines.

At present it is not known whether the techniques and assumptions used to estimate past exposures to radon daughters in the various Canadian mines, such as those in Newfoundland, Ontario and Saskatchewan, are similar or different. As a result it is difficult to compare the risk estimates obtained from one study to another.

The results of the study would enable us to compare and improve the risk estimates obtained from the various Canadian studies.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$45K			$45K

S.A.: P.J. Duport
Category: 1

Source: RRB, ACRP
Contact:

85. 8.10 In Vivo Measurements of Pb-210 in Newfoundland Fluorspar Miners: A Feasibility Study

It is proposed to measure the levels of Pb-210 in the skull and other bones of several fluorspar miners in Newfoundland who have previously received significant radon daughter exposures. The basic measurements will be done with a phoswich detector. Additional measurements will be done with the high energy resolution germanium detector of the Radiation Protection Bureau of Health and Welfare Canada.

This study will explore the feasibility of detecting Pb-210 fixed in the skull and other bones of fluorspar miners and relating these levels of Pb-210 with their corresponding recorded radon daughter exposures.

It is anticipated that this work will be of use in establishing a relation between the concentration of Pb-210 in the bones of miners and their lifetime exposure to radon daughters. It should also provide information on the distribution of Pb-210 in the bones of humans following the inhalation of radon daughters.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$20K			$20K

S.A.: K.P. Ho
Category: 1

Source: UMD, RPD
Contact:

85. 8.11 Application of ALARA to Nuclear Power Plant Off-Site Dose

It is proposed to perform a cost-benefit analysis to determine whether the current design and operating target for emissions from the latest nuclear power generating stations in Canada are effective in keeping radiation doses to persons off-site as low as reasonably achievable.

This project is proposed because the AECB has been using a target of one percent of licensed emission limits for liquid and gaseous effluents for several years without verifying, through cost-benefit analysis, whether further measures to reduce radiation doses to persons off-site might be reasonably achievable.

It is anticipated that the information obtained from this study will help the Board decide whether additional measures to reduce off-site radiation doses should be required, whether current methods of calculating off-site doses are appropriate, and whether the current design and operating target (1%) is still appropriate in light of any technological advances that have occurred since this target was established.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$60K			$60K

S.A.: D.J. Martin
Category: 1

Source: RRB
Contact:

85. 8.12 Measurement of Absorbed Fraction of Ingested Uranium in Humans

It is proposed to estimate the absorbed fraction (f_1) of ingested uranium in representative groups of persons in non-mining and in uranium mining communities. This will be done by measuring the daily dietary intake of uranium and comparing it against the daily excretion of uranium in the urine and feces of individuals.

The work is proposed because the currently available information on the absorbed fraction (f_1) in humans has a number of uncertainties and more work is needed to improve the accuracy of f_1 which forms the basis of the calculation of the Annual Limit on Intake (ALI) for uranium.

The results of the study are expected to improve the value for f_1 and hence the estimate of the ALI for uranium.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$60K	$20K		$80K

S.A.: K.P. Ho
Category: 3

Source: RPD
Contact:

9. Regulations & Regulatory Process Development

84. 9. 3 Methodologies for Evaluation of AECB Regulatory Programs

It is proposed to conduct a literature search and to prepare an annotated bibliography of program evaluation studies and reports, and other relevant material concerned with the evaluation of regulatory programs similar to the regulatory programs of the AECB. The project will also include a review and summary of the advantages and disadvantages of the various methods of evaluation used and will indicate the type of information required to use the various evaluation methods. Later phases of this research may be used to develop appropriate methodologies if none exist.

This project is being proposed because Treasury Board Policy Circular 1977-47, "Evaluation of Programs by Departments and Agencies" states that: "Departments and agencies of the federal government will periodically review their programs to evaluate their effectiveness in meeting their objectives and the efficiency with which they are being administered." Currently, there is limited information on methodologies for evaluating regulatory programs in Canada. However, regulatory agencies in other countries may have some experience in this area, and Canadian and foreign experience in the program evaluation of other regulatory areas may be applicable to the Canadian nuclear regulatory program.

It is anticipated that the information obtained from this project will be used in the design of the program evaluation assessments and studies in the implementation of the AECB's Program Evaluation Plan. The information would also be made available to other interested Canadian regulatory agencies, through the OCG Working Group on the Evaluation of Regulatory Programs.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$30K			$30K

S.A.: C. St-Arneault
Category: 1

Source: P&CD
Contact:

84. 9. 7 AECB's Process of Consultation with Employees of Its Licensees

It is proposed to continue funding a study and evaluation of the processes through which the AECB consults with workers (or their representatives) employed by licensees when proposing regulations or setting licence conditions concerning health and safety which might affect workers.

This study is proposed because employees who may be directly affected by AECB licences or regulations concerning radiological health and safety have generally not been widely consulted in the regulation-making or licensing procedure through methods other than the regulatory document process.

It is anticipated that the results of this study will be used to help the AECB review its methods of consulting with employees (or their representatives) of licensees. Furthermore, it is expected that these results will indicate whether additional formal steps in the overall public consultation process are required.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
	$15K	$5K			$20K

S.A.: E. Rochman
Category: 1

Source: RRB
Contact:

85. 9. 2 Socio-Economic Impact Analysis of Proposed General Amendment to Atomic Energy Control Regulations

It is proposed to investigate the socio-economic impact of the intended General Amendments to the Atomic Energy Control Regulations. The incremental costs and benefits of these regulations to the Canadian nuclear industry and other users of radioactive materials as well as to Canadian society in general will be predicted and subjected to cost-benefit or related analysis.

This work is being proposed in accordance with Treasury Board requirements concerning new major health, safety and fairness regulations. It is not yet known whether these amendments will have a "major" impact as defined in Chapter 490 of Treasury Board's Administrative Policy Manual, and hence the need for a socio-economic impact analysis has not yet been confirmed. However, the AECB anticipates that the level of public concern likely to be produced by these amendments will justify the performance of such an analysis. The AECB must determine whether any part of the proposed amendments to the regulations would pose unjustified costs and whether these amendments are the most effective means of meeting the objectives of health, safety, and environmental protection.

It is anticipated that the results of this study will aid the AECB in its review of the proposed amendments. In addition, this study is expected to be used to satisfy Treasury Board requirements.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
		$70K	$30K		$100K

S.A.: E. Rochman
Category: 1

Source: RRB
Contact:

85. 9. 3 Uranium Mine Radiation Safety Course

It is proposed to continue to fund the two sessions of the Uranium Mine Radiation Safety Course (UMRSC), one to be held in the spring in Saskatoon, Saskatchewan, the other in the autumn in Elliot Lake, Ontario. (The first course in this series was held in Elliot Lake in May, 1976.)

This course is designed to provide participants with the basic understanding of radiological hazards to workers and to the environment. It also presents practical approaches to deal with these hazards. The philosophy and regulatory approach of the AECB are discussed.

It is anticipated that this course will provide a better understanding of uranium mine radiation safety principles to mine supervisors, inspectors and operations personnel, representatives from regulatory agencies, mining companies and unions, who are directly involved in uranium mine radiation safety.

Past	FY 84/85	FY 85/86	FY 86/87	Future	Total
$265K	$68K	$70K	$70K		Ongoing

S.A.: K.P. Ho
Category: 1

Source: UMD
Contact:

09.Jan.85

SUMMARY ANALYSIS OF AECB R & D DRAFT BUDGET

BY MISSION OBJECT

(FY 85/86 BUDGET ALLOCATION: $3,462,000)

MISSION OBJECT	FY 85/86 ALLOCATION (K$)			
	CATEGORY 1	CATEGORY 2	CATEGORY 3	TOTAL
1. NUCLEAR REACTORS	567	535	-	1,102
2. HEAVY WATER PRODUCTION PLANTS	46	-	-	46
3. URANIUM MINES AND MILLS	390	20	50	460
4. OTHER FUEL CYCLE FACILITIES	280	200	-	480
5. WASTE MANAGEMENT	210	50	-	260
6. NON FUEL CYCLE APPLICATIONS	58	50	-	108
7. TRANSPORTATION	-	-	-	-
8. HEALTH PHYSICS	947	175	90	1,212
9. REGULATIONS & REGULATORY PROCESS DEVELOPMENT	175	-	-	175
10. SECURITY	-	-	-	-
TOTALS	2,673	1,030	140	3,843